

**WHAT IS CLAIMED IS:**

1. Process for the selective decomposition of  $N_2O$  to  $N_2$  and  $O_2$ , in a mixture of nitrous gases, comprising contacting said nitrous gases with a catalyst which consists of a porous ceramic support material and a catalytically active phase, said support material comprising at least 95 per cent by weight of at least one alkaline earth compound.

2. Process according to claim 1, wherein said at least one alkaline earth compound comprises at least one of magnesium oxide and calcium oxide.

3. Process according to claim 1 or 2, wherein said catalyst further comprises at least one stability improving additive selected from the group consisting of oxide sols and inorganic polymers.

4. Process according to claim 1 or 2, wherein said catalytically active phase consists of at least one member selected from the group consisting of oxides and mixed oxides of the elements Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, In, Ag, Ti, Y, Zr, La, Ca, Sr and Ba.

5. Process according to claim 1 or 2, wherein said catalytically active phase comprises 0.1% by weight to 50% by weight of the catalyst.

6. Process according to claim 1 or 2, wherein said catalytically active phase comprises 0.1% by weight to 5% of the catalyst.

5           7. Process according to claim 1 or 2 wherein said catalyst is in the form of a powder mixture.

8. Process according to claim 1 or 2, wherein said catalyst comprises a layer of the catalytically active phase on the surface of the porous ceramic support material.

10           9. Process according to claim 1 or 2, wherein said catalytically active phase of the catalyst is dispersed in the porous catalyst support.

10. Process according to claim 5, wherein the oxides and the mixed oxides of the catalytically active phase are produced wet chemically by mixed precipitation of corresponding carbonates, citrates, hydroxides and/or oxalates and subsequent drying and thermal decomposition of the precipitation product.

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11. Process according to claim 4, wherein the method of producing said catalyst comprises the step of adding to the support material at least one inorganic polymer in the form of magnesium phosphates, aluminum phosphates and/or boron phosphates in a range of from 3 % by weight to 20 % by weight based on the weight of the support material.

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12. Process according to claim 4, wherein the method of producing said catalyst comprises the step of adding to the support material at least one inorganic polymer in the form of aluminum hydroxide and/or polymeric magnesium silicates in a range of from 3 % by weight to 20 % by weight based on the weight of the support material.

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13. Process according to claim 5, wherein said elements are La, Cr, Mn, Fe, Co, Ni and Cu.

14. Process according to claim 13, wherein said element is Co.

15. Process according to claim 1 or 2, wherein said catalytically active phase comprises 5 % by weight to 20 % by weight of the catalyst.

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16. Process of claim 11, wherein the amount of the at least one inorganic polymer added to the support material is 8% by weight to 15% by weight based on the weight of the support material.

5 17. Process of claim 11, wherein the amount of the at least one inorganic polymer added to the support material is 8% by weight to 15% by weight based on the weight of the support material.